CA-NV AWWA Water Loss Technical Assistance Program

Wave 4 Water Audit Level 1 Validation Document

Validator Provided

Audit Information:

Utility: Carlsbad Municipal Water District PWS ID: 3710005

System Type: Potable Audit Period: Calendar 2016

Utility Representation: Mario Remillard (meter and customer services supervisor, and conservation coordinator)

Validation Date: 5/2/2017 Call Time: 9am Sufficient Supporting Documents Provided: Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 59 Data Validity Band (Level): Band III (51-70)

ILI: 1.30 Real Loss: 6.3 (gal/conn/day) Apparent Loss: 20.9 (gal/conn/day)

Non-revenue water as percent of cost of operating system: 3.3%

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

Validator Information:

Water Audit Validator: Kate Gasner / Carolyn Prescott (support) Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

#	AWWA Water Audit Input	Code	Final DVG	Basis of Input Derivation	Basis of Data Validity Grade
1	Volume from Own Sources	VOS	n/a	n/a	n/a
2	VOS Master Meter & Supply Error Adjustment	VOS MMSE A	n/a	n/a	n/a
3	Water Imported	WI	5	Import meter profile: Four Imported Water connections provide all Water Supplied. Three connections from San Diego County Water Authority and one with Vallecito Water District (billed through SDCWA). Import meters are large magnetic meters, at different locations throughout system. Notable drop in imports during the month of December due to CWA shutdown. Comments: Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.	Percent of import supply metered: 100% Signal calibration frequency: Verbal confirmation that this occurs annually, but no supporting documentation was provided. Volumetric testing frequency: None. Volumetric testing method: Does not occur. Percent of import supply volumetrically tested: None. Comments: All four connections are maintained the same way. Limiting factor for DVG is absence of calibration records.
4	WI Master Meter & Supply Error Adjustment	WI MMSE A	4	Input derivation: No correction provided in absence of available test data. Comments: None.	Import meter read frequency: Import meters are read continuously through a SCADA system. Supply meter read method: Automatic logging via SCADA telemetry. Frequency of data review for trends & anomalies: Unknown. At least monthly. Comments: Unknown treatment or correction of errant meter reads by Exporters.
5	Water Exported	WE	n/a	n/a	n/a
6	WE Master Meter & Supply Error Adjustment	WE MMSE A	n/a	n/a	n/a

7	Billed metered	BMAC	5	Customer meter profile: Age profile: Customer large meters were replaced in 2008. In 2010 to 2014 all small meters were replaced. Reading system: AMR. Read frequency: Monthly. Comments: Lag-time correction is not employed in input derivation. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed. Moving toward employing AMI system for purposes or more frequent reading and pressure zone monitoring.	Percent of customers metered: 100% Small meter testing policy: Reactive - complaint based or flagged-consumption testing only. Number of small meters tested/year: None Large meter testing policy: Reactive - complaint based or flagged-consumption testing only. Number of large meters tested/year: None Meter replacement policy: All meters changed out between 2008 and 2014, driven by need for read technology update. Future replacement will be informed by more representative testing. Number of replacements/year: Meters replaced upon failure or when flagged as problematic. Future meter replacement will be informed by testing program. Billing data auditing: Standard billing QC, plus review of volumes by use type each billing cycle. Financial auditor performs sampling review on select accounts each year. Comments: A number of meters beyond were proactively sampled and tested in 2017, and these results will be relevant for the 2017 water audit.
8	Billed unmetered	BUAC	n/a	n/a	n/a
9	Unbilled metered	UMAC	n/a	n/a	n/a
10	Unbilled unmetered	UUAC	5	Profile: Operational flushing and fire department usage. Comments: Flushing activities greatly scaled back due to drought. Custom California default of 0.25%xWS utilized.	Comments: Default grade applied.
11	Unauthorized consumption	UC	5	Comments: Default input applied.	Comments: Default grade applied.
12	Customer metering inaccuracies	CMI	4	See BMAC comments regarding meter testing & replacement activities. Input derivation: Inferred from reference data (manufacturer, anecdotal test results) but not derived from test data analysis & calculation. Comments: No additional comments.	Characterization of meter testing: Will employ proactive meter testing in the future. Currently meter testing is limited (upon request or consumption flag only). Characterization of meter replacement: Based on age - routine (proactive), but limited. Comments: No additional comments.

13	Systematic data handling errors	SDHE	5	Comments: Default input applied.	Comments: Default grade applied.
14	Length of mains	Lm	10	Input derivation: Totaled from GIS based map. Hydrant leads included: No. Comments: No additional comments.	Mapping format: Digital. Asset management database: In place but separate from GIS system. Map updates & field validation: Accomplished through normal work order processes. Comments: Construction and maintenance crews conducts random field validation.
15	Number of service connections	Ns	10	Input derivation: Standard report run from billing system. Basis for database query: Location or other premise-based ID. Comments: No additional comments.	CIS updates & field validation: Accomplished through normal meter reading processes. Estimated error of total count within: 1%. Comments: Billing account as well as GIS tracks number of service connections.
16	Ave length of cust. service line	Lp	10	Comments: Default input and grade applied, as customer meters are typically located at the property boundary given California climate.	
17	Average operating pressure	AOP	5	Number of zones, general profile: Gravity fed system with pressure breaking systems around system. SCADA system continuously monitors pressure at PRV sites. Typical pressure range: Input derivation: Calculated as simple average from analysis of field data. Comments: No additional comments.	Extent of static pressure data collection: System pressure is monitored at PRV sites via SCADA. Characterization of real-time pressure data collection: Basic - telemetry or pressure logging at boundary points (supply locations, tanks, PRVs, boosters). Hydraulic model: n/a Comments: No additional comments.
18	Total annual operating cost	TAOC	10	Input derivation: FY '15-16 data has been used to inform this, as it was the only financial data available. Comments: Confirmed costs limited to water only, and water debt service included. CIP project costs have not been included here.	Frequency of internal auditing: Annually. Frequency of third-party CPA auditing: Annually. Comments: No additional comments.
19	Customer retail unit cost	CRUC	9	Input derivation: Majority of consumption falls within Tier 1. Calculated as total consumptive revenue divided by Billed Metered Authorized Consumption.	Characterization of calculation: Weighted average composite of all rates. Input calculations have not been reviewed by an M36 water loss expert. Annual review of customer rate structure. Comments: No additional comments.

				Sewer charges are based on water meter readings, but sewer revenues are not incorporated into this value. Comments: No additional comments.	
20	Variable production cost	VPC	5	Supply profile: Import supply only. Primary costs included: Treatment chemicals, supply & distribution power, and purchase costs. Secondary costs included: None currently included. Comments: No additional comments.	Characterization of calculation: Primary costs only. Input calculations have not been reviewed by an M36 water loss expert. Comments: No additional comments.

Key Audit Metrics

(~) VALIDITY Data Validity Score: 59 Data Validity Band (Level): III

(#) VOLUME ILI: 1.3 Real Loss: 20.90 (gal/conn/day) Apparent Loss: 6.25 (gal/conn/day)

($) VALUE Annual Cost of Apparent Losses: $739,636 Annual Cost of Apparent Losses: $430,066

Infrastructure & Water Loss Management Practices:

Infrastructure age profile: Infrastructure ranges in age from the 1950s to the present. System is expanding – 18 new miles of mains were put in place in this past year.

Infrastructure comments: System is close to being built out.

Estimated main failures/year: Approximately 6 larger leaks/year. Estimated service failures/year: No estimate provided. Anecdotal discussion that these types of failures make up the majority of leaks as "hot" soil pits the copper service pipes.

Extent of proactive leakage management: To date leak detection has been reactive. Have plans to survey over 100 miles in the next year.

Other water loss management comments: None.

Comments on Audit Metrics & Validity Improvements

The Infrastructure Leakage Index (ILI) of 1.3 describes a system that experiences leakage 1.3 times the modeled technical minimum for its system characteristics.

The Data Validity Score falling within Band III (51-70) suggests that next steps may be focused simultaneously on improving data reliability and evaluating cost-effective interventions for water & revenue loss recovery. Opportunities to improve the reliability of audit inputs and outputs include:

- Improved understanding of Supply Meter (Own or Import) Master Meter Error: consider adopting or increasing the rigor of a source meter volumetric testing and calibration program, informed by the guidance provided in AWWA Manual M36 – Appendix A.
- Temporal alignment of Billed Metered Authorized Consumption with Water Supplied: consider pro-rating the first and last months of the audit period to better align consumption with actual dates of use, and using read date as basis for reporting.
- Customized estimate of Unbilled Unmetered Authorized Consumption: consider producing itemized, agency-specific estimates of unbilled unmetered (operational) uses, rather than using the default. Ensure leakage estimates are excluded.

When the CA-NV AWWA Water Audit Validator (WAV) program comes online after this year, is the utility planning on having a staff member become certified to perform the Level 1 Validation for future audits? Unsure.

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Water System Name: Carlsbad Municipal Water District **Water System ID Number: 3710005** **Water Audit Period:** Calendar 2016

Water Audit & Water Loss Improvement Steps:

Steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

In 2016 Carlsbad Municipal Water District started the implementation of a "Zone Metering System" by installing insertion meters at pressure breaking stations and retrofitting our AMR system to AMI. When the project is completed both technologies will provide real time information needed to calculate water loss by comparing water imported into a zone to water consumed in a zone.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, *Water Audits and Loss Control Programs, Manual M36, Fourth Edition* and in the Free Water Audit Software version 5.

Wendy Chambers	General Manager	Wendy Chambers	9/28/17
Executive Name (Print)	Executive Position	Signature	Date